

NASA TECH BRIEF



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Neon Isotopes Cancel Errors in Gas Laser

The problem:

To provide a method of cancelling frequency pushing errors arising from unequal (nonreciprocal) gain in the two contracirculating beams of a helium-neon filled discharge tube used in a ring laser.

The solution:

Use a mixture consisting of approximately equal volumes of neon 20 and neon 22 or other pairs of neon isotopes in the neon portion of the helium-neon filling.

Each isotope of neon governs a frequency pushing effect on the operating frequency of the laser. As the spectral line center frequencies of the isotopes lie on opposite sides of the operating frequency, the pushing effects are in opposite directions and cancel. Also, because of the mixed neon isotopes, the central portion of the gain versus frequency curve of the laser has a smooth simple maximum. The laser frequency

can therefore be uniquely stabilized to this maximum by applying a slight frequency dither (by means of a piezoelectrically driven corner mirror) and synchronously detecting the resulting amplitude modulation.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
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Reference: B66-10583

Patent status:

No patent action is contemplated by NASA.

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Category 02